Subject: Risk Assessment Evaluation of Breast Feeding Pathway

A recent draft risk assessment evaluation performed for the Portland Harbor Superfund project has shown the importance of the breast feeding pathway for infants, a pathway not commonly included in risk assessments. This pathway is not specific to the Portland Harbor site. I would like to discuss the breast feeding pathway issues with the Cleanup Program PMT.

Background

The breast feeding pathway was initially raised years ago by EPA on the Portland Harbor project. The Lower Willamette Group (LWG) was informed that EPA may require an evaluation of this pathway. I was skeptical about including it, and asked for appropriate equations and guidance. In 2005, EPA finalized their risk assessment guidance for combustion facilities[1], and included the breast feeding pathway. The pathway is also presented in EPA's 1997 *Exposure Factors Handbook*[2], and the 2002 *Child-Specific Exposure Factors Handbook*[3]. EPA provided me with the risk assessment for the GE/Housatonic River site[4] as an example of applying the pathway to river sediments contaminated with PCBs. After reviewing the information provided by EPA and evaluating the Portland Harbor data, I reached the following conclusions:

- Breast feeding is a relevant exposure pathway at the Portland Harbor site, and at many other sites with bioaccumulating chemicals.
- There are reasonable risk assessment analytical tools to evaluate risks from breast feeding.
- EPA has guidance documents on including this pathway.
- For the Portland Harbor site, and for similar sites (such as Bradford Island), we will calculate high risks to breast-feeding infants.
- For PCBs, the highest calculated risks are from breast-feeding, so this pathway could become the risk driver for establishing cleanup levels.

After looking at the preliminary results for Portland Harbor, the government risk assessment team (EPA, DEQ, and DHS) recognized the sensitive nature of this pathway. Public health agencies all conclude that breast feeding is highly recommended for infants, and a risk assessment showing hazard quotients well above 1,000 could easily discourage mothers from breast feeding. We contacted DHS early about our initial results, and agreed to cooperate with them. Following the approach taken at the Housatonic River site, we see a need to include in the risk assessment a discussion of the substantial benefits of breast feeding. From a public health perspective, breast feeding is recommended, almost regardless of the level of contamination in breast milk. In fact, breast feeding appears to offset some of the adverse health effects associated with prenatal exposure that necessarily occurs from a mother with contaminated breast

[1] U. S. EPA. *Human Health Risk Assessment Protocol for Hazard Waste Combustion Facilities*. EPA 530-R-05-006, September 2005.
[2] U.S. EPA. *Exposure Factors Handbook.* National Center for Environmental Assessment, Office of Research and Development. August 1997.
[3] U.S. EPA. *Child-Specific Exposure Factors Handbook.* National Center for Environmental Assessment, Office of Research and Development. EPA-600-P-00-002B, Interim Report. September 2002.
[4] U.S. Army Corps of Engineers, U.S. EPA. *Human Health Risk Assessment, GE/Housatonic River Site, Rest of River,* Volume 1. February 2005.

milk. Benefits are not typically addressed in risk assessments, but the breast feeding pathway is unique enough to warrant an exception.

Dave Farrer (DHS) and I presented the breast feeding issue at the March 2008 Region 10 partners meeting to get broader input from state (Alaska, Idaho, and Washington) and federal (EPA and ATSDR) environmental and health agencies. After integrating the risk assessment and public health elements, Dana Davoli (EPA), Dave Farrer, and I refined our approach in the form of a draft memorandum directing the LWG on how to conduct a risk assessment of breast feeding, and how to present the public health issue. The draft memorandum is being reviewed at EPA Region 10, and a related health consultation is being reviewed at ATSDR headquarters. The draft memorandum is available at <file://\\deqnwr1\vcsshare\tox group\breastfeeding>, but it is not necessary to know the details presented in the highly technical memorandum intended for risk assessors.

It is not clear to me why the breast feeding pathway has not been included in risk assessments at other major sites. At the Housatonic River site, the evaluation of breast feeding was limited to exposure calculations, and did not include an explicit risk calculation. The government risk assessment team for Portland Harbor sees no reason why the pathway should be excluded. Given that the primary risk to human health is from exposure to PCBs, and the primary exposure to PCBs is from the breast feeding pathway, we would consider it highly inappropriate if this pathway were not included. The LWG will begin their Portland Harbor risk assessment this summer. We therefore need to provide direction to them on if and how to include this pathway.

Issues for DEQ Management

The breast feeding pathway is certainly not unique to Portland Harbor. Also, the pathway is not limited to sites with highly contaminated fish or other food products. Regardless of the source of PCBs to the adult, it appears the breast feeding pathway will be the risk driver. For instance, a typical site where the main exposure pathway is exposure to surface soil should also include an evaluation of breast feeding risks.

Given my current knowledge about the breast feeding pathway, I think we should specify that the pathway be included in risk assessments performed at DEQ cleanup sites. PCBs are the most important chemical, but the pathway is relevant to other bioaccumulative chemicals. I am in the process of revising our human health risk assessment guidance, and can include the appropriate equations after further discussion with the toxicology work group. Following our proposed approach for the Portland Harbor site, we will likely want to include references to the benefits of breast feeding. The recent DHS health consultation would be an appropriate document to either reference or append to our guidance.

It would also be appropriate to revise our *Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment* (April 2007), and include sediment and biota screening levels based on the breast feeding pathway. I am aware that current sediment screening levels for PCBs are below detection limits. We have a generic remedy for PCBs in soil that may also need to be re-evaluated.

The importance of contaminants in breast milk has been recognized by public health professionals for years. The DHS fish advisory for the lower Willamette River already states that:

> Women of childbearing age, particularly pregnant or breastfeeding women, … should avoid eating resident fish from Portland Harbor, especially carp, bass and catfish.

It appears that risk assessors have not been providing quantitative support for these types of public health advisories. I look forward to discussing with the PMT how best to address the breast feeding pathway in DEQ risk assessments.